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arrangement and scientific treatment. Long collections of facts are given, which not infrequently have no close logical or causal connection with each other. The book contains a vast amount of information, some of which is so incomplete as to be almost misinformation, arranged on the dictionary or encyclopædia style—interesting reading, but rather disconnected. It is to be feared that a beginner would form a very hazy notion of the science of meteorology, particularly of the broad principles underlying the details of the science from a perusal of it. As a reference book on some points and a storehouse of facts it is valuable to the student. The series of weather maps already alluded to cannot fail to be of great assistance. H. B. K.

Air-breathing Animals of the Palæozoic in Canada, up to 1894,
by SIR WM. DAWSON, C.M.G., LL.D., F.R.S. Trans. Roy.
Soc. Canada, Section IV., 1894, pp. 71–88.

“Our knowledge of the animal inhabitants of the land in Palæozoic time is very meager in comparison with what is known of marine creatures. There was probably less land in early Palæozoic ages than later. Atmospheric conditions may have been less favorable to breathers in air. Life on land requires a higher nervous and muscular system than those necessary in water, and different means of respiration.” Animal life therefore probably originated in the waters. A long time may have been required to introduce the land life. The chances of preservation of aquatic organisms were much greater than were those of terrestrial species. The paucity of land fossils may be accounted for by these less favorable conditions.

The finding of Batrachian footprints by Logan in 1841 was the first indication of air-breathing vertebrates in the Carboniferous rocks. The first discovery of osseous remains of Palæozoic land vertebrates in America was that of *Baphetes planiceps* found by the author in the Pictou coal field in 1850. The first announcement of Devonian insects was from St. Johns, N. B., in 1862 by Hartt. Insects had previously been found in the Carboniferous of Europe, and have since been traced back to the Silurian. The earliest known Carboniferous millipede was *Xylobius sigillaria*, discovered by the author in Nova Scotia in 1858. Many millipedes have since been found in the Carboniferous and Devonian on both sides of the Atlantic. The first known land snail was found by Lyell and the author at South Joggins in 1851.

This form of land life has since been found in other coal regions in America and in the Devonian plant beds of St. Johns, but not in Europe. Spiders and scorpions were found in the Palæozoic beds of Europe before they were recognized in America.

The known land animals of the Palæozoic of Canada embrace: *Vertebrata*, twenty-six species, all Amphibia; *Arthropoda*, thirty-three species, embracing insects, scorpions and myriapods, and *Mollusca*, five species of pulmonate snails. The author gives a classified list of these land fossils, with notes and brief descriptions of the new forms. Under the head of *Vertebrata* he observes that no land vertebrates have been recognized lower than the base of the Carboniferous system. Some Devonian fishes may have been endowed with a swimming-bladder capable of being used as an imperfect lung after the manner of the modern dipnoi. We may hope, however, yet to find land vertebrates in the Devonian.

The author adds a very interesting note on two erect stumps of trees recently found by Mr. P. N. McNaughton in the coal series at South Joggins. The hollow of one of these contained the fragmentary remains of nine species of vertebrates, including about thirty individuals. Besides this there were numerous fragments of millipedes, and rather rare remains of *Pupa vetusta*. The second stump contained remains of thirteen individuals, including four or five species. Both stumps occur at considerably lower horizons than the well-known stumps found many years ago by Lyell and the author.

The paper closes with helpful and stimulating suggestions to collectors.

T. C. C.

Om klitternes vandring, by K. J. V. STEENSTRUP (Meddelelser fra Dansk Geologisk Forening, Bianco Lunos Kgl. Hof-bogtrykkeri, Kjöbenhavn, 1894).

Dr. Steenstrup calls attention to some characteristic features of the sand dunes on the west coast of Jutland. He has made out these features partly by observations in the field and partly by study of the topographical charts of the war department. These charts are constructed on a scale of 1 : 20,000 with contour-intervals of five feet, and exhibit well the topographic characters of the sand dunes. The author finds that the original shape of these wind-formed hills, seen in plan, is that of parabolic ridges, which have their concave and open side